Paper No. 15

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MARY LAFUZE COMER
and THOMAS EDWARD HORLANDER

Appeal No. 2004-1674
Application 09/428,322[1]

ON BRIEF

Before KRASS, JERRY SMITH, and BARRETT, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) from the final rejection of claims 1-5, 8, and 10-24. Claims 6, 7, and 9 have been objected to.

We reverse.

[1] Application for patent filed October 28, 1999, entitled "Apparatus and Method for Deriving an Enhanced Decoded Reduced-Resolution Video Signal From a Coded High-Definition Video Signal," which is based on and claims priority from U.S. Provisional Application 60/133,429, filed May 11, 1999.

BACKGROUND

The invention relates to an apparatus and method for decoding a coded high-definition (HD) video signal having a first resolution to provide an image at a reduced second resolution suitable, for example, for producing a picture-in-picture (PIP). Because the PIP is small, there is no need to provide a HD PIP display. It was known to provide a lower-resolution second simpler and less expensive decoder for the PIP. The invention uses an intermediate third resolution lower than the first resolution and higher than the reduced second resolution to achieve high-quality motion compensations and improve PIP quality (specification, page 7, lines 4-14).

Claim 1 is reproduced below.

> 1. In apparatus for decoding compressed image data including frequency domain coefficients defining blocks of pixel values representing an image at a first resolution to provide an image at a reduced second resolution for display, said apparatus comprising:
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> first means responsive to a selected sub-set of said frequency domain coefficients for deriving said image of said reduced second resolution for display and including,
>
> enhanced motion-compensation-unit (MCU) processing means; and
>
> second means for operating said enhanced MCU processing means with blocks of pixel values representing said image at an intermediate third resolution lower than said first resolution and higher than said reduced second resolution.

THE PRIOR ART

The examiner relies on the following reference:

Boyce et al. (Boyce) 5,614,957 March 25, 1997

THE REJECTION

Claims 1-5, 8, and 10-24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Boyce.

We refer to the final rejection (Paper No. 7) (pages referred to as "FR__") and the examiner's answer (Paper No. 13) (pages referred to as "EA__") for a statement of the examiner's rejection, and to the brief (Paper No. 12) (pages referred to as "Br__") for a statement of appellants' arguments thereagainst.

OPINION

The rejection and arguments

The examiner finds that Fig. 4 of Boyce shows a primary decoder 401 and reduced resolution decoders 402, 403 (FR3). The examiner refers to column 18, lines 48-53, for a teaching that the reduced resolution decoder processes only the upper left block of DCT coefficients, which is equivalent to a selected sub-set of frequency domain coefficients (FR3). It is noted that column 19, lines 6-12, discloses a motion compensation predictor (MCP) circuit used in connection with the PIP decoder (FR4). The examiner reasons (FR4):

> Figure 4 shows an additional reduced resolution decoder (403). The image outputted by 403, will be representative of resolution 3, which is less than that of resolution 1.

> While Boyce does not specifically teach resolution 3 being greater than resolution 2, Boyce does teach that the PIP arrangement of Figure 4 is not limited to a specific degree of resolution, only that the secondary decoders 402 and 403, be reduced resolution decoders, as compared to 401 (Column 19, Lines 23-30). Therefore, the actual degree of resolution, with respect to resolution 3, can be less than resolution 1, while being greater than resolution 2. It would have been obvious to one of ordinary skill in the art to utilize decoders of varying resolution to achieve greater PIP versatility.

Appellants observe (Br5) that Boyce discloses that a separate reduced resolution decoder 402 or 403 is used for each additional image that is to be displayed in addition to the main picture (col. 18, lines 25-31) and discloses combining the main picture output from primary decoder 401 with the reduced resolution pictures output by the reduced resolution decoders 402, 403 (col. 18, lines 32-37). It is argued that each of the three decoders 401, 402, and 403 processes a different image signal and produces a different image (i.e., a different channel) (Br6). It is argued that there is no particular relationship between resolutions 2 and 3 since each is intended to produce its own independent PIP image and resolutions 2 and 3 can be, and most likely are, in fact, equal resolutions according to what Boyce states (Br6). Appellants argue that the final rejection does not recognize that, unlike the three independent decoders for three independent images in Boyce, all of the rejected claims recite the same single image throughout the claim (Br6). It is argued that Boyce does not teach or suggest

performing the motion compensation using the intermediate third resolution data (Br7-8).

The examiner responds that claims 1, 11, and 18 do not require "an image" to be construed as the same image throughout (EA6). The examiner finds that "each decoder, 401, 402, and 403, have their [sic, has its] own motion compensation circuit[], and the output of each decoder, will inherently affect the PIP processing prior to display" (EA6). The examiner finds that column 19 discloses that the decoders are capable of producing images at ¼ and ½ the resolution and, therefore, reduced resolution decoders 402 and 403 can have different reduced resolutions (EA7).

Analysis

The specification discloses base- and enhancement-layers of decimated pixels from the full image (specification, page 7, lines 4-14). The effective pixel decimation of the enhancement layer is only 2 as opposed to 4 for the base-layer (specification, page 13, lines 2-4; page 18, lines 35-36). The invention is directed to using the intermediate resolution enhancement-layer data together with the base-layer data in the motion-compensation unit (MCU) to provide a reduced resolution image of greater resolution than is obtainable by using just the decimated pixels of the base-layer (Fig. 2; specification, page 7, lines 12-14; page 15, lines 18-30).

As a matter of claim interpretation, the claims require the images of reduced second and third resolutions to be derived from the image at a first resolution. Claim 1 recites "compressed image data including frequency domain coefficients defining blocks of pixel values representing an image at a first resolution." Claim 1 then recites "means responsive to a selected sub-set of said frequency domain coefficients for deriving said image of said reduced second resolution," where a "sub-set of said frequency domain coefficients" refers to the frequency domain coefficients of the image at a first resolution. Claim 1 then recites "blocks of pixel values representing said image at an intermediate third resolution," where "said image" refers to the image at a first resolution. Claims 11 and 18 contain similar limitations. While we agree with the examiner that it would have been obvious to operate the reduced resolution decoders 402 and 403 at different resolutions (e.g., to have two different sizes of PIP), this does not meet the language of the claims. While we also conclude that it would have been obvious to operate the three decoders on the same image (i.e., there is no reason why the main picture and the two different reduced resolution PIPs could not be of the same image), this interpretation of Boyce also does not meet the claim language.

According to the claims, the motion compensation must be performed using the intermediate third resolution data.

Appellants point out (Br7-8) that the claims require the limitations of "operating said enhanced MCU processing means with blocks of pixel values representing said image at an intermediate third resolution lower than said first resolution and higher than said reduced second resolution" (claim 1), "using data at an intermediate third resolution, lower than said first resolution but higher than said reduced second resolution, to supplement data from said reduced second resolution in forming prediction for motion compensation" (claim 11), and "generating data representative of an image pixel block at an intermediate third resolution ...[and] generating motion compensated pixel block data at said third resolution from said pixel block data of said reduced second resolution supplemented by said intermediate third resolution data" (claim 18). We agree with appellants that these limitations are not taught by Boyce. The output of one of the reduced resolution decoders in Boyce is not used in conjunction with the output of the other reduced resolution decoder in a motion-compensation unit. The examiner acknowledges that each decoder has its own motion compensation circuit (EA6) and, thus, that the decoders are independent. Because Boyce does not teach performing motion compensation on image data of a reduced second

resolution using intermediate third resolution data, the rejection of claims 1-5, 8, and 10-24 is reversed.

REVERSED

ERROL A. KRASS)
Administrative Patent Judge)
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JERRY SMITH) BOARD OF PATENT
Administrative Patent Judge) APPEALS
) AND
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